(D) (GB) (F) (RU) 6000-3580-0000-1XX **35800-2019 V100** 06/2019

PREMASGARD® **232x - Modbus - T3**

S+S REGELTECHNIK

PREMASGARD®
232x - Modbus - T3

(D) Bedienungs- und Montageanleitung

Druck- und Differenzdruckmessumformer,
incl. Anschluss-Set,
mit **Modbus**-Anschluss (**Tyr 3**)

(GB) Operating Instructions, Mounting & Installation

Pressure and differential pressure measuring transducers,
incl. connection set,
with **Modbus** connection (**Tyr 3**)

(F) Notice d'instruction

Convertisseur de pression et de pression différentielle,
y compris kit de raccordement,
avec raccordement **Modbus** (**Tyr 3**)

(RU) Руководство по монтажу и обслуживанию

Преобразователь давления измерительный и
преобразователь давления измерительный дифференциальный,
вкл. комплект соединительных деталей,
с возможностью подключения к шине **Modbus** (**Tyr 3**)

S+S REGELTECHNIK

S+S REGELTECHNIK GMBH
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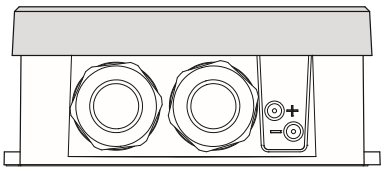
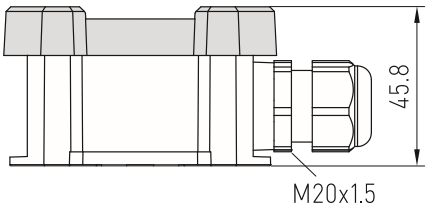
PREMASGARD® 232x - Modbus - T3

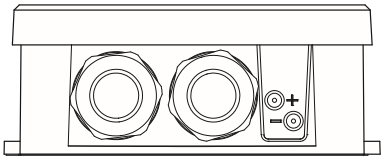
Maßzeichnung
Dimensional drawing
Plan coté
Габаритный чертеж

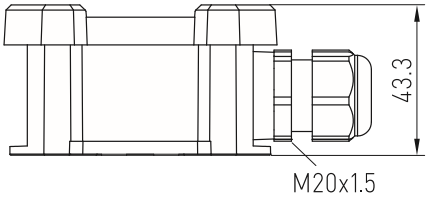
PREMASGARD®
232x - Modbus - T3





mit Display
with display
avec écran
с дисплеем





ohne Display
without display
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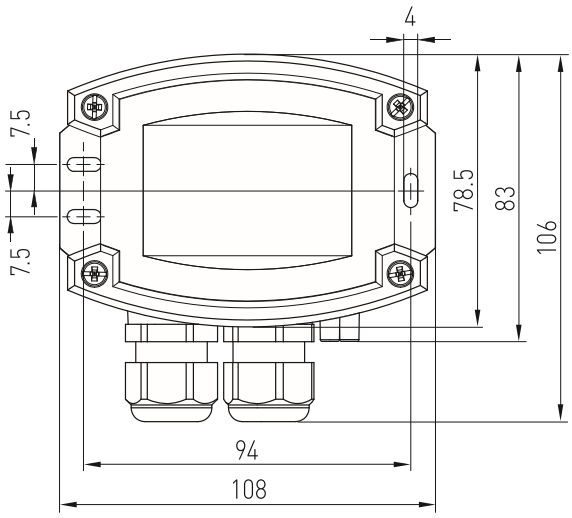
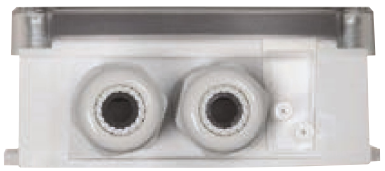
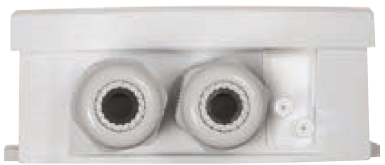


PREMASGARD®
232x - Modbus - T3

Anschlüsse
Connections
Raccordements
Соединительные патрубки





WS-04

Wetter- und Sonnenschutz (optional)

Weather and sun protection (optional)

Protection contre les intempéries et le soleil (en option)

Приспособление для защиты от непогоды и солнечных лучей (опция)

The maintenance-free microprocessor-controlled **PREM**ASGARD® **232x-Modbus-T3** (series), with Modbus connection, impact-resistant plastic enclosure, enclosure cover with quick-locking screws, **optionally with/without display,** is used for detecting positive, negative, or differential pressure measurement in clean air. The piezo-resistive measuring element is temperature-compensated and guarantees high reliability and accuracy. The pressure transmitters are provided with a push-button for manual zero point calibration and an adjustable offset. Applications of these pressure sensors are in cleanroom, medical and filter technology, at ventilation and air conditioning ducts, at spray booths, in large-scale catering facilities, for filter monitoring and level measurement, or for triggering frequency converters. Media measured with these pressure transducers are air (non-precipitating), or other gaseous non-aggressive, non-combustible media. The pressure sensor has a manual zero point pushbutton. Fine adjustment by the user is possible at any time.
The delivery includes the connection set **ASD-06** (2 m connection hose, two pressure connection nipples, screws).

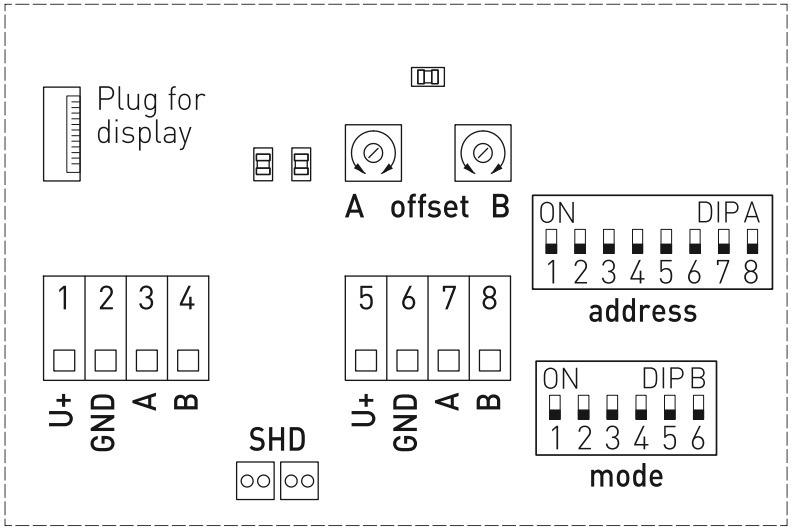
TECHNICAL DATA

Power supply:	24 V AC (±20%) and 15...36 V DC
Power consumption:	< 1.2 W / 24 V DC; < 1.8 VA / 24 V AC
Type of pressure:	differential pressure
Pressure connection:	4 / 6 x 11 mm (hoses Ø = 4 / 6 mm)
Measuring ranges:	**–500...+500 Pa** or **–7000...+7000 Pa** depending on the type of device, see table
Accuracy:	**Type 2328** (500 Pa): typically ± 3 Pa at +25 °C **Type 2327** (7000 Pa): typically ± 35 Pa at +25 °C compared to the calibrated reference device
Above-/below-pressure:	max. ± 50 kPa
Zero point offset:	± 5 % of measuring range
Medium:	clean air and other non-aggressive, non-combustible gases
Media contacting parts:	Brass, Ni, Duroplast, Si, epoxy, RTV, BSG, UV silicone gel
Media temperature:	–20...+50 °C (temperature-compensated 0...+50 °C)
Hysteresis:	0.3% of final value
Linearity:	< ± 1% of final value
Temperature drift values:	± 0.1 % / °C
Long-term stability:	± 1 % per year
Bus parameters:	**can be configured and addressed** via DIP switches **in the absence of current delivery** (under currentless conditions)
Bus interface:	RS 485, **galvanically isolated,** Bus termination activatable via DIP switches. Up to 32 devices possible in one segment. In case of a greater number of devices, RS485 transceivers must be used.
Bus protocol:	Modbus (RTU mode), address range 0...**247** selectable
Baud rate:	9600, 19200, 38400 Baud
Status indicator:	LED green = Telegram valid / LED red = Telegram error
Signal filtering:	4 s / 32 s
Enclosure:	plastic, UV-stabilised, material polyamide, 30% glass-globe reinforced, with quick-locking screws (slotted / Phillips head combination), colour traffic white (similar to RAL 9016), enclosure cover for display is transparent!
Enclosure dimensions:	108 x 78.5 x 43.3 mm (Tyr 3 without display) 108 x 78.5 x 45.8 mm (Tyr 3 with display)
Cable gland:	2x M 20 x 1,5; with strain relief, exchangeable, inner diameter 8-13 mm
Electrical connection:	0.2 - 1.5 mm², using push-in terminals
Permissible air humidity:	< 95% r. H., non-precipitating air
Protection class:	III (according to EN 60730)
Protection type:	IP65 (according to EN 60529)
Standards:	CE conformity, electromagnetic compatibility according to EN 61 326, EMC directive 2014 / 30 / EU
Optional:	**Display with illumination**, three-line, programmable, cut-out approx. 51 x 29 mm (W x H), for displaying the ACTUAL pressure or an individually programmable display value (The Modbus interface allows the display to be individually configured in the 7-segment area and in the dot-matrix area.)

Measuring Range Pressure range	**Type / WG01** **PREM**ASGARD® **232x-Modbus-T3**	**Output**	**Display**	**Item No.**
–500... +500 Pa	PREMASGARD 2328	Modbus		1301-12C4-0910-200
–500... +500 Pa	PREMASGARD 2328 LCD	Modbus	■	1301-12C4-4910-200
–7000...+7000 Pa	PREMASGARD 2327	Modbus		1301-12C4-0950-200
–7000...+7000 Pa	PREMASGARD 2327 LCD	Modbus	■	1301-12C4-4950-200
Accessories				
ASD-06	**Connection set (included in the scope of delivery),** consisting of 2 connection nipples (straight) made of ABS, 2 m PVC hose, soft, and 4 tapping screws			7100-0060-3000-000
ASD-07	**2 connection nipples** (at 90 degree angle) made of plastic, ABS			7100-0060-7000-000
DAL-01	**Pressure outlet** for ceiling or in-wall installation (e.g. in clean rooms)			7300-0060-3000-001
WS-04	**Weather and sun protection**, 130 x 180 x 135 mm, stainless steel **V2A** (1.4301)			7100-0040-7000-000

Schematic diagram

PREMASGARD®
232x-Modbus-T3



LED (internal status)

Offset correction

Shielding

DIP A: Bus address

DIP B: Bus parameters
(Baud rate, parity...)

Telegram indicator
Reception (LED green)
Error (LED red)

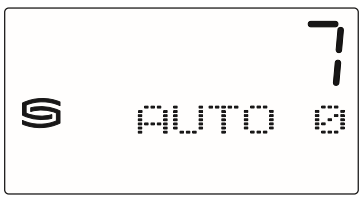
Manual zero point calibration

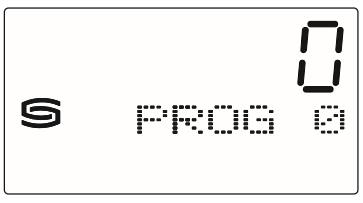
1. The device must be operative for at least 60 minutes before zero point setting is started.
2. Connect pressure inputs P (+) and P (–) with a hose (differential pressure between the connections = 0 Pa).
3. To set the zero point, press the **"auto zero" pushbutton** for 10 seconds without interruption.

By pressing the pushbutton, a countdown of approx. 10 seconds is started. The yellow LED is blinking and the countdown is shown on the display (optional).

After the countdown period has elapsed, zero point calibration takes place. This is indicated by continuous LED light and at the display (optional) by switching from "AUTO 0" to "PROG 0".

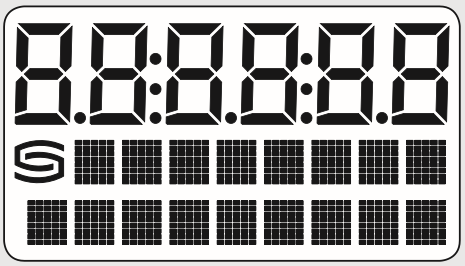
Note: When releasing the pushbutton during countdown (counter > 0), zero point setting is immediately aborted!





Display - individually **programmable**

Modbus Tyr 3



Manual offset adjustment

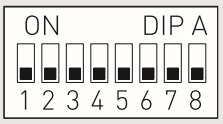
The sensors are pre-set and calibrated at the factory.

For subsequent adjustment of the measured value, there is an **offset potentiometer** (A).
The adjusting range is ± 5 % of the pressure measuring range.

BUS ADDRESS

Bus address (binary coded, value selectable from 1 to 247)							
DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
128	64	32	16	8	4	2	1
ON	**ON**	OFF	OFF	OFF	OFF	OFF	**ON**
Example shows 128 + 64 + 1 = 193 as Modbus address.							

MODBUS
DIP switch [A]



The device address in the range of **1 to 247** is set at DIP switch [A].
For switch positions 1 to 8 see the table on the back!

Address 0 is reserved for broadcast messages.
Addresses greater than 247 must not be assigned and are ignored by the device.
The DIP switches are binary-coded with the following values:

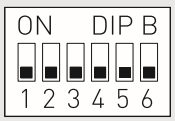
DIP 1 = **128** ..... DIP 1 = **ON**
DIP 2 = **64** ..... DIP 2 = **ON**
DIP 3 = 32 ..... DIP 3 = OFF
DIP 4 = 16 ..... DIP 4 = OFF
DIP 5 = 8 ..... DIP 5 = OFF
DIP 6 = 4 ..... DIP 6 = OFF
DIP 7 = 2 ..... DIP 7 = OFF
DIP 8 = **1** ..... DIP 8 = **ON**

The switch positions shown here results in the Modbus address **128 + 64 + 1 = 193**

BUS PARAMETERS

Baud rate (selectable)	DIP 1	DIP 2
9600 baud	**ON**	OFF
19200 baud	**ON**	**ON**
38400 baud	OFF	**ON**
Reserved	OFF	OFF

MODBUS
DIP switch [B]



Parity (selectable)	DIP 3
EVEN (numbered)	**ON**
ODD (numbered)	OFF

Parity check (on/off)	DIP 4
Active (1 stop bit)	**ON**
Inactive (no parity) (2 stop bits)	OFF

8N1 mode (on/off)	DIP 5
Active	**ON**
Inactive (default)	OFF

Bus termination (on/off)	DIP 6
Active	**ON**
Inactive	OFF

The baud rate (speed of transmission) is set at DIP switches 1 and 2 of DIP switch block [B].
Selectable are **9600 baud, 19200 baud**, or **38400 baud** – see table!

Parity is set at DIP switch 3 of DIP switch block [B].
Selectable are **EVEN** or **ODD** – see table!

Parity check is activated via DIP switch 4 of DIP switch block [B].
Selectable are **active (1 stop bit)**, or **inactive (2 stop bits)**, i.e. no parity check – see table!

The **8N1 mode** is activated via DIP switch 5 of DIP switch block [B].
The functionality of DIP switch 3 (parity) and DIP switch 4 (parity check) of DIP switch block [B] is therefore deactivated.
Selectable are 8N1 **active** or **inactive (default)** – see table!.

Bus termination is activated via DIP switch 6 of DIP switch block [B].
Selectable are **active** (bus termination resistance of 120 Ohm), or **inactive** (no bus termination) – see table!

When bus parameters and bus address are changed at devices with **display**, the respective settings are shown on the display for approx. 30 seconds.

COMMUNICATION INDICATOR

Communication is indicated via two LEDs. Error-free received telegrams are signalized by the green LED lighting up, regardless of the device address. Faulty telegrams or triggered Modbus exception telegrams are depicted by the red LED lighting up.

DIAGNOSTICS

An error diagnostic function is integrated

READOUT IN THE DISPLAY

By default, the first line indicates the value while the second line indicates the corresponding unit **statically**:
Differential pressure [Pa]

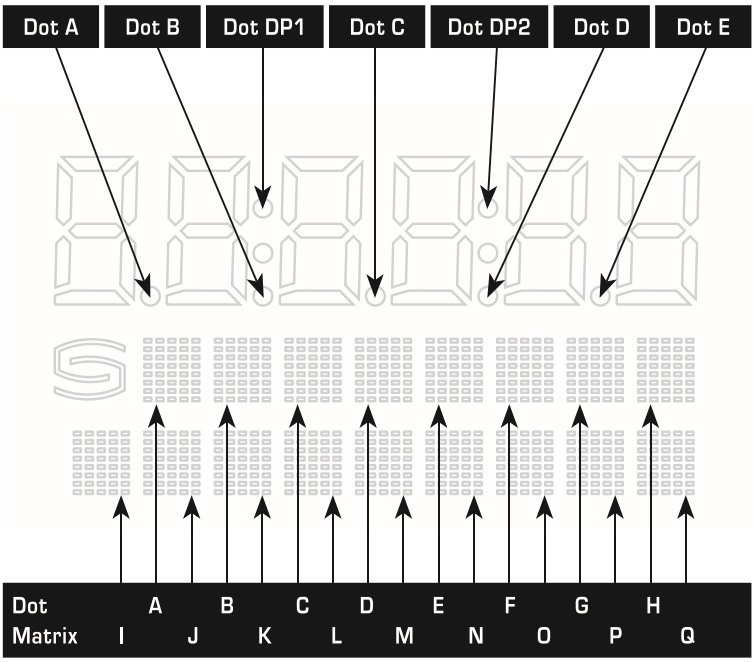
The Modbus interface allows the display screen to be individually configured, both in the 7 segment range and in the dot-matrix range. This means that messages such as those from the PLC can be displayed.

For the **individual display**, the register 4x0001 (physical display value) must contain the value 10.
The registers 4x0002 to 4x0022 contain information about the characters and segments to be displayed.
The two left-aligned positions are represented by the register 4x0003 (range -9...99). The value 0 switches off the display of both positions. The display is only active if the register 4x0002 has positive values.

In the **default setting** (register 4x0001 contains the value 0 for the standard display),
even the characters I-Q (registers 4x0014 to 4x0022) are freely programmable in the dot-matrix range.
In this case, the current measured value is automatically displayed in the 7-segment area.

Composition of Segment Pattern **(Register 4x0005)**

Bit 0..... **Dot A**
Bit 1..... **Dot B**
Bit 2..... **Dot C**
Bit 3..... **Dot D**
Bit 4..... **Dot DP1**
Bit 5..... **--**
Bit 6..... **Dot E**
Bit 7..... **Dot DP2**
Bit 8..... **--**
Bit 9..... **--**
Bit 10.... **--**
Bit 11.... **--**
Bit 12.... **--**
Bit 13.... **--**
Bit 14.... **--**
Bit 15.... **--**



ASCII Code Table for Dot Matrix Display Area

ASCII	Sign
32	Blank
33	!
34	“
35	#
36	$
37	%
38	&
40	(
41	)
42	*
43	+
44	,
45	-
46	.
47	/
48	0
49	1
50	2
51	3
52	4

ASCII	Sign
53	5
54	6
55	7
56	8
57	9
58	:
59	;
60	<
61	=
62	>
63	?
64	@
65	A
66	B
67	C
68	D
69	E
70	F
71	G
72	H

ASCII	Sign
73	I
74	J
75	K
76	L
77	M
78	N
79	O
80	P
81	Q
82	R
83	S
84	T
85	U
86	V
87	W
88	X
89	Y
90	Z
91	[
93	]

ASCII	Sign
94	^
95	_
96	\
97	a
98	b
99	c
100	d
101	e
102	f
103	g
104	h
105	i
106	j
107	k
108	l
109	m
110	n
111	o
112	p
113	q

ASCII	Sign
114	r
115	s
116	t
117	u
118	v
119	w
120	x
121	y
122	z
123	{
124	|
125	}
129	ü
132	ä
142	Ä
148	ö
153	Ö
154	Ü
223	°

ASCII characters or control characters are displayed as spaces.

TELEGRAMS

Function 04 Read Input Register

Register	Parameter		Data Type	Value	Range
3x0001	Differential pressure	Without filtering	Signed 16 Bit	–5000...+5000 –7000...+7000	–500,0...+500,0 Pa –7000...+7000 Pa
3x0002	Differential pressure	Filtering 1 s	Signed 16 Bit	–5000...+5000 –7000...+7000	–500,0...+500,0 Pa –7000...+7000 Pa
3x0003	Differential pressure	Filtering 10 s	Signed 16 Bit	–5000...+5000 –7000...+7000	–500,0...+500,0 Pa –7000...+7000 Pa

Function 05 Write Single Coil

Register	Parameter	Data Type	Value	Range
0x0001	AutoZero	Bit 0	0 / 1	ON - OFF

Function 06 Write Single Register & Function 16 Write Multiple Register

Register	Parameter (Display)	Data Type	Value	Range
4x0001	Physical parameter displayed	Unsigned 8 Bit	0...10	0...10
	Standard display: Differential pressure [Pa]		0	Default setting
	Alternative display:			
	Freely configurable display		10	

Continued on next page!

Function 06 Write Single Register & Function 16 Write Multiple Register

Register	Parameter (Display)	Data Type	Value	Range
4x0002	7-Segment Value	Signed 16 Bit	–999...9999	–999...9999
4x0003	7-Segment Value	Signed 8 Bit	–9...99	–9...99
4x0004	–			
4x0005	Segment Pattern	Unsigned 16 Bit		See Binary Pattern
4x0006	Dot Matrix Character A	Unsigned 8 Bit	0...255	ASCII character
4x0007	Dot Matrix Character B	Unsigned 8 Bit	0...255	ASCII character
4x0008	Dot Matrix Character C	Unsigned 8 Bit	0...255	ASCII character
4x0009	Dot Matrix Character D	Unsigned 8 Bit	0...255	ASCII character
4x0010	Dot Matrix Character E	Unsigned 8 Bit	0...255	ASCII character
4x0011	Dot Matrix Character F	Unsigned 8 Bit	0...255	ASCII character
4x0012	Dot Matrix Character G	Unsigned 8 Bit	0...255	ASCII character
4x0013	Dot Matrix Character H	Unsigned 8 Bit	0...255	ASCII character
4x0014	Dot Matrix Character I	Unsigned 8 Bit	0...255	ASCII character
4x0015	Dot Matrix Character J	Unsigned 8 Bit	0...255	ASCII character
4x0016	Dot Matrix Character K	Unsigned 8 Bit	0...255	ASCII character
4x0017	Dot Matrix Character L	Unsigned 8 Bit	0...255	ASCII character
4x0018	Dot Matrix Character M	Unsigned 8 Bit	0...255	ASCII character
4x0019	Dot Matrix Character N	Unsigned 8 Bit	0...255	ASCII character
4x0020	Dot Matrix Character O	Unsigned 8 Bit	0...255	ASCII character
4x0021	Dot Matrix Character P	Unsigned 8 Bit	0...255	ASCII character
4x0022	Dot Matrix Character Q	Unsigned 8 Bit	0...255	ASCII character

Function 08 Diagnostics

The following **sub function codes** are supported

Sub Function Code	Parameter	Data Type	Answer
00	Echo of transmission data (Loopback)		Echo data
01	Restart Modbus (Reset listen-only mode)		Echo telegram
04	Activation listen-only mode		No answer
10	Delete counter		Echo telegram
11	Counter bus telegrams	Unsigned 16 Bit	All valid bus telegrams
12	Counter communication errors (Parity, CRC, frame errors, etc.)	Unsigned 16 Bit	Faulty bus telegrams
13	Counter exception telegrams	Unsigned 16 Bit	Error counter
14	Counter slave telegrams	Unsigned 16 Bit	Slave telegrams
15	Counter telegrams without answer	Unsigned 16 Bit	Broadcast messages (address 0)

Function 17 Report Slave ID

Composition of answer telegram

Byte Nr.	Parameter	Data Type	Answer
00	Number of bytes	Unsigned 8 Bit	6
01	Slave ID (device type)	Unsigned 8 Bit	13 = **PREMAS**GARD® **232x**
02	Slave ID (device class)	Unsigned 8 Bit	30 = **PREMAS**GARD® / **PREMAS**REG®
03	Status	Unsigned 8 Bit	255 = RUN, 0 = STOP
04	Version number (release)	Unsigned 8 Bit	1...9
05	Version number (version)	Unsigned 8 Bit	1...99
06	Version number (index)	Unsigned 8 Bit	1

(GB) General notes

This device can be mounted in any position. Pressure ranges (measuring ranges) are indicated on the device label. Applying measuring pressures beyond that range will cause mismeasurements and increased deviations or may destroy the pressure measuring transducer.

- Attention! When leading in cables, make sure, they do not go under the board. This might buckle or damage hose connections!
- Pressure inputs are "poled" i.e. the above-atmospheric pressure line must be connected at input P+ and the below-atmospheric pressure line must be connected at input P–.
- At an adjusting element, the output signal can be offset by ± 5 % of the final value of the measuring range. In this way, possible ageing or drift effects can be compensated.
- By changing the offset at the adjusting element, factory-calibration is lost!
- If this device is operated beyond the specified range, all warranty claims are forfeited.

Our "General Terms and Conditions for Business" together with the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry" (ZVEI conditions) including supplementary clause "Extended Retention of Title" apply as the exclusive terms and conditions.

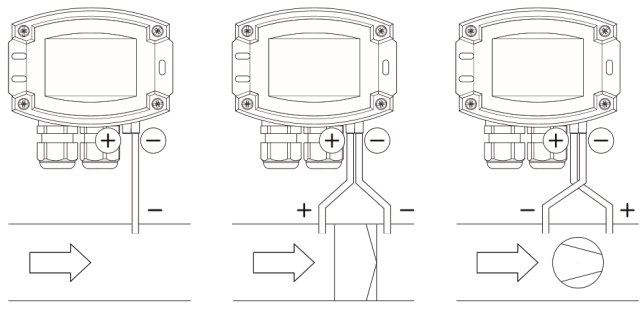
In addition, the following points are to be observed:

- Devices must only be connected to safety extra-low voltage and under dead-voltage condition. To avoid damages and errors at the device (e.g. by voltage induction) shielded cables are to be used, laying parallel with current-carrying lines is to be avoided, and EMC directives are to be observed.
- This device shall only be used for its intended purpose. Respective safety regulations issued by the VDE, the states, their control authorities, the TÜV and the local energy supply company must be observed. The purchaser has to adhere to the building and safety regulations and has to prevent perils of any kind.
- No warranties or liabilities will be assumed for defects and damages arising from improper use of this device.
- Consequential damages caused by a fault in this device are excluded from warranty or liability.
- These devices must be installed and commissioned by authorised specialists.
- The technical data and connecting conditions of the mounting and operating instructions delivered together with the device are exclusively valid. Deviations from the catalogue representation are not explicitly mentioned and are possible in terms of technical progress and continuous improvement of our products.
- In case of any modifications made by the user, all warranty claims are forfeited.
- This device must not be installed close to heat sources (e.g. radiators) or be exposed to their heat flow. Direct sun irradiation or heat irradiation by similar sources (powerful lamps, halogen spotlights) must absolutely be avoided.
- Operating this device close to other devices that do not comply with EMC directives may influence functionality.
- This device must not be used for monitoring applications, which serve the purpose of protecting persons against hazards or injury, or as an EMERGENCY STOP switch for systems or machinery, or for any other similar safety-relevant purposes.
- Dimensions of enclosures or enclosure accessories may show slight tolerances on the specifications provided in these instructions.
- Modifications of these records are not permitted.
- In case of a complaint, only complete devices returned in original packing will be accepted.

Notes on commissioning:
This device was calibrated, adjusted and tested under standardised conditions.
When operating under deviating conditions, we recommend performing an initial manual adjustment on-site during commissioning and subsequently at regular intervals.

Commissioning is mandatory and may only be performed by qualified personnel!
These instructions must be read before installation and commissioning and all notes provided therein are to be regarded!

Mounting diagram **PREM**ASGARD® **232x - Modbus - T3**



TYPES OF MONITORING:

(A) Below-atmospheric pressure:
P1 (+) is not connected
but open against atmosphere
P2 (–) connected to inside of duct

(B) Filter:
P1 (+) connected upstream of filter
P2 (–) connected downstream of filter

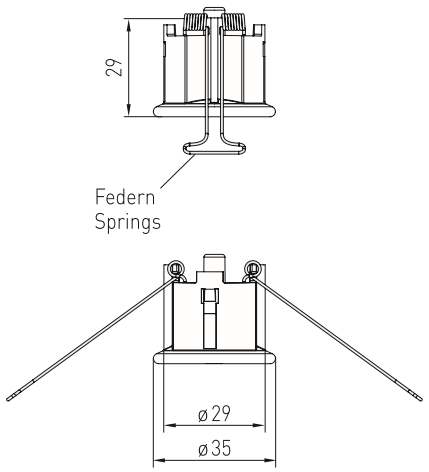
(C) Ventilator:
P1 (+) connected downstream of ventilator
P2 (–) connected upstream of ventilator

Pressure connections at the pressure switch are marked with
P1 (+) for higher pressure and
P2 (–) for lower pressure.

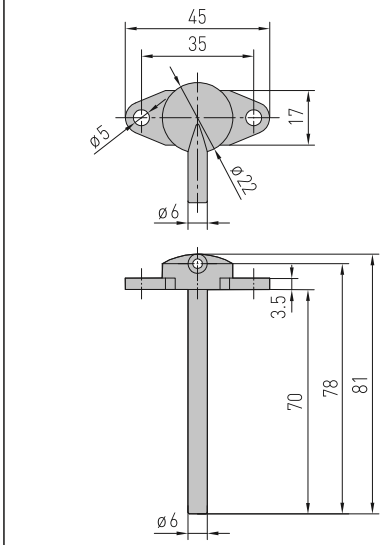
Conversion table for pressure values:

Unit =	bar	mbar	Pa	kPa	mH_2O
1 Pa	0.00001 bar	0.01 mbar	1 Pa	0.001 kPa	0.000101971 mH_2O
1 kPa	0.01 bar	10 mbar	1000 Pa	1 kPa	0.101971 mH_2O
1 bar	1 bar	1000 mbar	100000 Pa	100 kPa	10.1971 mH_2O
1 mbar	0.001 bar	1 mbar	100 Pa	0.1 kPa	0.0101971 mH_2O
1 mH_2O	0.0980665 bar	98.0665 mbar	9806.65 Pa	9.80665 kPa	1 mH_2O

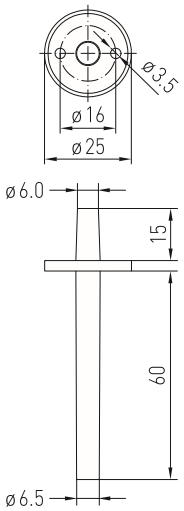
Maßzeichnung **DAL-01**
Dimensional drawing
Plan coté
Габаритный чертеж



Maßzeichnung **ASD-07**
Dimensional drawing
Plan coté
Габаритный чертеж



Maßzeichnung **ASD-06**
Dimensional drawing
Plan coté
Габаритный чертеж



DAL-01
Druckauslass
Pressure outlet
Sortie pression
Клапан выпуска давления

ASD-07
Anschlussnippel
Connection nipple
Embouts de raccordement
Соединительный ниппель

ASD-06
Anschluss-Set
Connection set
Kit de raccordement
Комплект соединительных деталей

Busadresse, binärcodiert
Bus address, binary coded
Adresse du bus, code binaire
Адресс шины, двоичный

S+S REGELTECHNIK

1		51		101		151		201	
2		52		102		152		202	
3		53		103		153		203	
4		54		104		154		204	
5		55		105		155		205	
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7		57		107		157		207	
8		58		108		158		208	
9		59		109		159		209	
10		60		110		160		210	
11		61		111		161		211	
12		62		112		162		212	
13		63		113		163		213	
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49		99		149		199			
50		100		150		200			